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Final
Barrier Wall Performance Monitoring Plan

McCormick & Baxter
Creosoting Company
Portland, Oregon

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Prepared for:

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
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1 Introduction

This barrier wall performance-monitoring plan has been developed to immediately begin monitoring groundwater movement and potential nonaqueous phase liquid (NAPL) migration inside and outside the barrier containment system. The performance monitoring plan presents a strategy for monitoring the containment system through hydraulic head measurements; NAPL gauging; visual observation of beach seeps; groundwater and NAPL flux measurements; and chemical monitoring of beach seeps, groundwater, and surface water.

Several studies have been completed for evaluation of barrier wall containment systems. Results of these studies determined that the barriers are monitored as containment systems, not as single entities within a containment system. The performance of a barrier wall is generally not monitored singly, but the containment system is monitored for overall performance in meeting the design objective of the remedial system (United States Environmental Protection Agency [EPA], 1998: *Evaluation of Subsurface Engineered Barriers at Waste Sites*, August 1998; EPA Document Number 542-R-98-005). These studies have also indicated that monitoring plans vary widely for passive and active containment systems. At the McCormick & Baxter Creosoting Company (McCormick & Baxter) site, prevention or cutoff of outflow from the containment system (i.e., to reduce or slow the rate of flow of groundwater or the contaminant plume) with no associated groundwater extraction is referred to as a *passive system*.

The fully encompassing barrier wall will be monitored for performance routinely. Before construction of the barrier wall, groundwater elevation and NAPL thickness measurements were routinely taken at select monitoring locations on site. Automated groundwater elevation measurements were taken three weeks before construction, and this continued during the installation of the wall. This performance-monitoring plan discusses monitoring objectives, schedules, and reporting milestones. The performance-monitoring program includes the following elements:

- Installation of nested monitoring wells inside and outside the barrier wall for hydraulic gradient monitoring;

- Collection of hydraulic data at scheduled intervals;
- Chemical monitoring of surface water, sediment pore water, and groundwater, and measurements of groundwater and NAPL flux, to be conducted in September/October 2003 (a detailed sampling and analysis plan [SAP] for this activity will be developed before commencement of fieldwork);
- Regularly scheduled visual inspections of the shoreline and existing seep areas; and
- Reporting of data collection results.

Installation and monitoring of the new monitoring wells will commence as soon as the barrier wall is installed. In order to adequately document steady-state or "normal cycle" conditions and draw conclusions regarding the barrier wall's effectiveness with high certainty, the monitoring plan proposes a three-year cycle to fully understand the effects of seasonal changes in groundwater flow patterns, river stage and flood patterns, and overall performance of the barrier wall.

Upon completion of the sediment cap design and installation, the barrier wall performance-monitoring plan will be coordinated with the long-term monitoring and maintenance of the sediment cap.

1.1 Monitoring Plan Objectives

The monitoring system proposed for the McCormick & Baxter site will be used to evaluate the functional performance of the containment system and to determine whether the containment system is performing the designed function. The main objectives and goals of this monitoring plan are as follows:

- Understand changes in groundwater flow outside and inside the barrier containment system;
- Understand changes in gradients/fluxes from the bluff to the river on the north and south sides of the containment system;
- Understand groundwater flow and contaminant flux along the riverfront downgradient of the containment system;
- Determine the effects of groundwater flow toward Willamette Cove in relation to existing NAPL seeps; and
- Determine effects of river stage and tidal influence of groundwater flux on the river.

The monitoring plan describes the new monitoring well installation that will be conducted to complete the monitoring network (Section 2), describes the performance monitoring (Section 3), and summarizes the reports that will be submitted as part of the performance monitoring (Section 4).

2 Monitoring Well Installation

New groundwater monitoring wells will be installed at several locations to monitor groundwater gradients inside and outside the barrier wall. The monitoring wells will be installed as a series of well "nests" inside and outside the barrier wall at approximately 300-foot to 400-foot spacing. Each monitoring well nest will include a shallow, intermediate, and deep monitoring well to measure horizontal and vertical gradients inside and outside the wall. Figure 1 shows the proposed location for each monitoring well to be installed following completion of the barrier wall. Figure 2 shows a typical nest of monitoring wells inside and outside the barrier wall. Based on conversations with the Oregon Department of Water Resources, it is likely that a well completion variance can be obtained to install three monitoring wells within one borehole. The issuance of a variance will likely be based on the following site conditions:

- The installation of clustered monitoring wells will be completed in one distinct aquifer at the site. Telescoping during drilling will not be necessary to install the multiple wells and screens within a single aquifer system;
- The primary purpose of the well installation is to monitor both vertical and horizontal groundwater gradients at the site, both inside and outside the barrier wall; and
- Analytical sampling of these new wells is not part of the monitoring program.

The variance request will be filed with the Department of Water Resources prior to the start of fieldwork. Existing monitoring wells will be adapted or used as either interior or exterior wells, depending on their location relative to the barrier wall.

Nested Monitoring Well Installation

Several drilling techniques were evaluated to install the nested monitoring wells proposed for the site. However, because of site topography (i.e., slope and soft sand), access to the barrier wall downgradient of the FWDA and TFA requires a track-mounted drill rig, which limits the type of drill rig that can be used. For these reasons, well nests located along the riverfront (i.e., MW-36 through MW-45 and MW-58) will be installed using a track-mounted, hollow-stem auger drill rig (Figure 1). The well nests at MW-36 through MW-45 and MW-58 will include one shallow, intermediate and deep monitoring well contained within one borehole, and will consist of the following:

- A shallow monitoring well screened between 12 feet and -8 feet (mean sea level, MSL) to evaluate groundwater conditions in the upper portion of the aquifer. In addition, the shallow monitoring wells, in which the screened interval will straddle the water table at least 90% of the time throughout the year, can be used to monitor lighter-than-water nonaqueous phase liquid migration;

- An intermediate monitoring well screened at an elevation approximately -30 feet to -35 feet MSL to evaluate groundwater conditions in the intermediate portion of the aquifer. The intermediate monitoring wells will be constructed similar to the shallow wells, except that the well screen length will be shortened to 5-foot sections. The 5-foot screens may provide better definition of groundwater gradient data for these deeper wells; and

- A deeper monitoring well screened between 80 feet and 90 feet BGS (approximate screen elevation -50 feet to -55 feet NVGD) to evaluate groundwater conditions beneath the vertical barrier wall. The deeper zone monitoring wells may be used to monitor denser-than-water (DNAPL) migration, if it is occurring. Two wells (one installed in the former waste disposal area [FWDA] and one installed in the tank farm area [TFA]) may be completed to 100 feet to 110 feet BGS to determine how deep DNAPL has traveled. Similar to the intermediate wells, the deeper wells will be equipped with 5-foot well screens.

Shallow Monitoring Well Installation

Shallow monitoring wells (MW-46 through MW-57) will be installed using a Geoprobe, or similar push-probe drill rig, to install the shallow wells in the upland portion of the site. Push-probe drilling was selected for the shallow well installation based on cost savings, limited drill cuttings, and quick installation methods. Push-probe wells will require additional development time for the pre-packed well screens. The push-probe drilling will consist of the following completion methods:

- Shallow monitoring wells will be installed using 15 feet to 20 feet of 2-inch polyvinyl chloride (PVC) pre-packed well screen with 2-inch flush-threaded PVC riser pipe. Two-inch wells are proposed to allow for downhole monitoring (i.e., transducers, sampling, and NAPL gauging) that may be performed. Some studies have indicated that using a Teflon filter media around well screens can increase the infiltration of NAPL into the well. Two shallow monitoring wells proposed for installation in areas that have historically exhibited NAPL will be constructed using the Teflon filter media. The remaining shallow wells will be constructed using typical silica sand filter media. NAPL accumulation into these newly installed monitoring wells might take up to one year;

- All shallow monitoring wells will be completed so that the well screen straddles the water column during most of the year. Based on current understanding of water table fluctuations throughout the year, well screens for the shallow wells will be 15 feet to 20 feet long. Exact monitoring well completions may be altered in the field, based on site conditions encountered during drilling.

- Wells will be screened between 12 and -8 feet MSL to monitor water table changes; and

- Wells will be completed above ground with protective bollards.

Well Locations and Designations

Proposed monitoring wells MW-46 through MW-57 will be installed where the barrier wall depth is 46 feet BGS. Only shallow wells were proposed for installation in this area because the thickness of the aquifer in these areas is approximately 10 feet to 15 feet. Figure 1 shows the new and existing monitoring wells that will be used in the monitoring of the groundwater gradient at the site.

The monitoring wells designated with an *s* (e.g., MW-36s) are wells screened in the shallow zone. Those wells designated with an *i* (e.g., MW-36i) are to be screened in the intermediate zone, and those wells designated with a *d* (e.g., MW-36d) are to be screened in the deep zone. All deep zone monitoring wells will be screened beneath the total barrier wall depth in that location.

Approximately 45 new monitoring wells and 27 existing monitoring wells will be used to monitor groundwater elevations and gradients inside and outside the barrier wall. The proposed monitoring well locations were selected based on a review of the existing groundwater flow patterns at the site and the presence of NAPL. In addition, some well nests were selected to correspond to observed seep locations along the riverfront and in Willamette Cove. The locations of the new and existing monitoring wells at the site provide adequate monitoring of the entire wall, at upgradient and downgradient locations. The spacing between the new monitoring wells meets the recommendations of the EPA (1998) guidance document regarding subsurface-engineered barriers. This document recommends a minimum spacing of 400 feet between monitoring wells, with wells located within 30 feet of the barrier wall for hydraulic monitoring.

The proposed well depth intervals for the new monitoring wells are based on the monitoring intervals currently used on site, with wells in the shallow zone, the intermediate zone, and the deeper zone. The shallow zone has slightly higher permeability sediments than those in the intermediate and deeper zones. The three depth intervals were selected to ensure consistency with historical groundwater monitoring practices at the site. Monitoring water levels at the three depth intervals will allow for calculation of vertical and horizontal flow/gradients around and beneath the wall.

Well Surface Completion Methods

All wells that will be installed or adopted into the program must have above-grade completions with three protective bollards and be clearly marked in order to not be damaged during future construction activities at the site. Surface completions for monitoring wells installed along the downgradient portion of the wall (i.e., MW-36 through MW-45) must be designed to allow for future bank layback and regrading considerations. These downgradient wells will be constructed using a 10-foot steel conductor casing driven to approximately 7 feet BGS, which will allow for regrading of the bank without undercutting the surface completion and damaging the well. It is anticipated that some re-fitting of monitoring well surface completions may be necessary following bank regrading and future soil capping of the site.

Well Development

All wells will be allowed to stabilize for twenty-four hours prior to development. The wells will be developed using a combination of surging, bailing, and pumping techniques to achieve maximum hydraulic connection. The installed wells will be developed until the water is clear and sediment free. Well development will continue until a minimum of five to ten well volumes (including volumes for sand pack and basal pack) have been purged from the well. Water quality parameters of temperature, pH, turbidity, conductivity, and dissolved oxygen will be collected and allowed to stabilize within a 10% range before terminating development.

All development water will be transferred to a holding tank located behind the TFA shop building.

3 Performance Monitoring

This section describes the proposed performance-monitoring program that will be initiated after the barrier wall is installed.

Section 3.1 describes how water level measurements will be recorded and evaluated to determine whether the barrier wall system is providing adequate hydraulic and NAPL containment. Section 3.2 discusses visual inspection and monitoring, and Section 3.3 discusses water quality monitoring.

3.1 Performance Monitoring Water Level Measurement

Water level monitoring will be the main indicator of whether the wall is meeting the performance goals. The following elements clarify how measurement of water levels can determine how the wall is performing:

- At several sites where the aquitard is relatively homogeneous, water levels inside the wall will ideally be relatively uniform and flat across the site. If the wall leaks, then the uniform pattern will be altered, and the monitoring wells located near the leak should show groundwater elevations different from those away from the leak. Such changes in gradient could occur because the wall has potential for leakage along its entire length and depth. These changes in gradient would impart a detectable slope to the water table as water leaks through the wall. However, at the McCormick & Baxter site, the aquitard is not homogeneous and the gradient inside the wall will not likely be flat in the areas where the aquitard is absent, because of communication with the river. Horizontal water levels may eventually flatten after placement of the soil cap and reduction of infiltration, but the vertical gradients will probably always be in flux. In addition, it is unlikely that the proposed monitoring points would detect minor leakage through the wall. Only a major leak or catastrophic failure would be detected by the current and proposed monitoring points;

- If the aquitard has a preferential vertical flow path, or in the case of the FWDA (where no aquitard is present), apparent vertical gradient changes may occur across the site, as the water flows from an area with the aquitard toward an area that does not have one (i.e., from the TFA toward the FWDA). Tidal fluctuations will also be transmitted differently in these areas. Vertical gradient changes will also result during river stage changes, especially during the spring flood events. For these reasons, it is critical to place transducers in several downgradient wells to monitor aquifer response to river/tidal changes; and

- Water levels will approach at least a normal cycle of steady state following placement of a soil cap at the site. Groundwater levels will change relative to the river and will be muted toward the bluff. Pressure gradients will still exist at depth in the intermediate and deep aquifer zones from changes in the tidal and stage fluctuations.

Groundwater level measurements taken during preconstruction of the barrier wall and post-construction are discussed fully in the following sections.

3.1.1 Water Level Monitoring

Groundwater gradient data are being collected as the construction of the barrier is completed. Four existing monitoring wells (MW-As, MW-33s, MW-Js, and MW-Os) are equipped with pressure transducers that are monitoring water levels in the shallow zone at 1-hour intervals. These wells were selected based on spatial location and do not exhibit NAPL thickness. In addition, manual water levels are being recorded weekly at several existing wells to monitor groundwater level trends in the shallow aquifer zone. Table 1 lists the existing wells that are monitored.

Following completion of the barrier wall and installation of the new monitoring wells, water levels will be recorded manually and by automated pressure transducers in existing wells and new wells along the exterior and interior of the wall. Figure 1 shows the locations of the wells that will be monitored for water levels after the wall is completed.

Automated Water Level Data Collection

Twenty-four select monitoring wells will be equipped with pressure transducers to collect water level measurements. Table 1 lists these proposed wells. Water levels will be collected at least once per hour. The monitoring intervals for the transducers will taper off over time from 1 hour to daily or weekly once the dynamics of the contained system are understood. The pressure transducers will be equipped with internal batteries to allow for in-situ placement in the well. Data can be downloaded at each transducer location using a laptop computer or handheld PDA. Use of a data logger is not necessary with this type of pressure sensor. Monitoring wells located around the perimeter of the containment system and in Willamette Cove (MW-36, MW-37, MW-40, MW-41, MW-44, MW-45, MW-50s, MW-51s, MW-54s, MW-55s, and MW-58) will be equipped with pressure transducers to monitor tidal effects and river stage in the Willamette River and the overall effects on groundwater flow patterns. The proposed continuous water level monitoring approach can be easily implemented and maintained, allowing for real-time acquisition and continuous measurements.

To monitor river stage, a stilling well will be installed in the river (see Figure 1). The stilling well will be equipped with a pressure transducer to record river stage data and diurnal tidal cycles. The river stage data collected by the pressure transducer located in front of the site can eliminate the current need for a correction factor used to extrapolate river stage data from the Morrison Bridge in Downtown Portland to the site and provide more reliable river stage data in front of the McCormick & Baxter site.

Manual Water Level Data Collection
Several existing and proposed new monitoring wells will also be part of the barrier wall monitoring. Twenty-seven existing monitoring wells and 45 new monitoring wells are proposed for monitoring by manually recording water levels on a scheduled basis. Table 1 lists all the wells proposed for manual water level collection.

Analysis of Groundwater Data
The proposed barrier wall groundwater level measurements will be collected to document a "normal cycle" of the contained system inside and outside the wall. Hourly and weekly water level monitoring of the wells shown in Figure 1 will be of adequate frequency to confirm performance of the barrier wall and to detect failure with sufficient time to provide for mitigation, if appropriate. Failure of the barrier wall may include a dramatic rise in water levels inside the wall (i.e., a bathtub effect). Large fluctuations in water levels inside the wall could cause water to flow over the top of the wall. Another type of failure may include an increase in detection of large quantities of NAPL (i.e., additional seeps) outside the wall, which may indicate a subsurface failure or breakthrough. Although NAPL exists outside the containment system, large increases in NAPL may indicate breakthrough of the containment system. Mitigation activities may include groundwater pumping inside the wall to stabilize water levels and induce an inward flow, and subsurface investigations outside the wall to help determine whether subsurface NAPL breakthrough is occurring. Figure 3 presents a generic decision process that highlights what actions may be implemented based on changing site conditions.

3.2 Visual Inspection and Monitoring
Barrier wall performance will include visual inspections conducted weekly. The weekly monitoring will likely taper off as the contained system is more fully understood during seasonal changes. The visual inspections will include monitoring of the existing seep areas in Willamette Cove and along the shoreline in front of the FWDA and TFA. During the weekly visual inspections, the entire riverfront will be checked for the presence of new seep areas, sheen observed on the surface water, and any other observations. If site conditions change during the weekly inspections, the Oregon Department of Environmental Quality project manager will be notified immediately. The visual inspections will be compared with water level gradients and flow data to identify any trends that may require action.

3.3 Water Quality Monitoring

Water quality monitoring and sampling will be completed in two sampling events. Currently, groundwater sampling is conducted semiannually at select monitoring wells. Semiannual sampling will continue during barrier wall monitoring. In addition, a September 2003 sampling event will be performed. This sampling will include surface water, sediment pore water, and groundwater sampling, and NAPL flux measurements, similar to the sampling that was completed in September 2002. A detailed SAP for the September 2003 sampling event will be completed in the next several months. Barrier wall monitoring will be coordinated with sediment cap monitoring and maintenance once the sediment cap is installed.

3.4 Post-Construction Sampling and Testing of the Barrier Wall

Future sampling and testing of the barrier wall containment system should be performed to evaluate the integrity of the slurry and sheet pile wall. Several activities can be performed to evaluate barrier wall integrity:

- Completion of non-destructive tests, which could include cone penetration testing, cross-hole seismic surveys, ground-penetrating radar, seismic surveys, tomography, a surface-based seismic refraction survey, or dye tracing;
- Collection of slurry cores to evaluate hydraulic conductivity;
- Quantifying the degree of wall effectiveness through analytical sampling outside the wall may determine if there is contaminant loading to the river. For example, detection of highly elevated levels of PAHs downgradient of the FWDA, which are currently relatively low may indicate that containment is not being met; and
- Re-evaluation of the groundwater model.

Tomography and other seismic geophysical methods can be used to determine whether sheet pile joints have separated following construction. However, these methods may not produce subsurface images with adequate resolution to detect small sheet separation.

3.5 Performance Monitoring Schedule

Performance monitoring will commence as soon as the barrier wall is installed. It is unlikely that true normal cycle conditions at the site can be fully documented with high certainty in a one-year cycle. The monitoring plan proposes a three-year cycle to fully document seasonal changes in groundwater flow patterns, river stage and flood patterns, and overall performance of the barrier wall. If necessary, during the monitoring program, groundwater data could be used to modify the existing groundwater model (Ecology and Environment, Inc. [E&E], 2001, *Draft Barrier Wall Groundwater Modeling Report, August 2001*) and develop a prediction of steady-state conditions at the site. Table 1 provides the schedule for performance monitoring of the barrier wall. Groundwater measurements will be manually recorded weekly for three years at select site monitoring wells. Automated groundwater data will be collected from 12 pressure transducers located along the riverfront portion of the wall to monitor groundwater level fluctuations and tidal and river stage influences.

4 Reporting

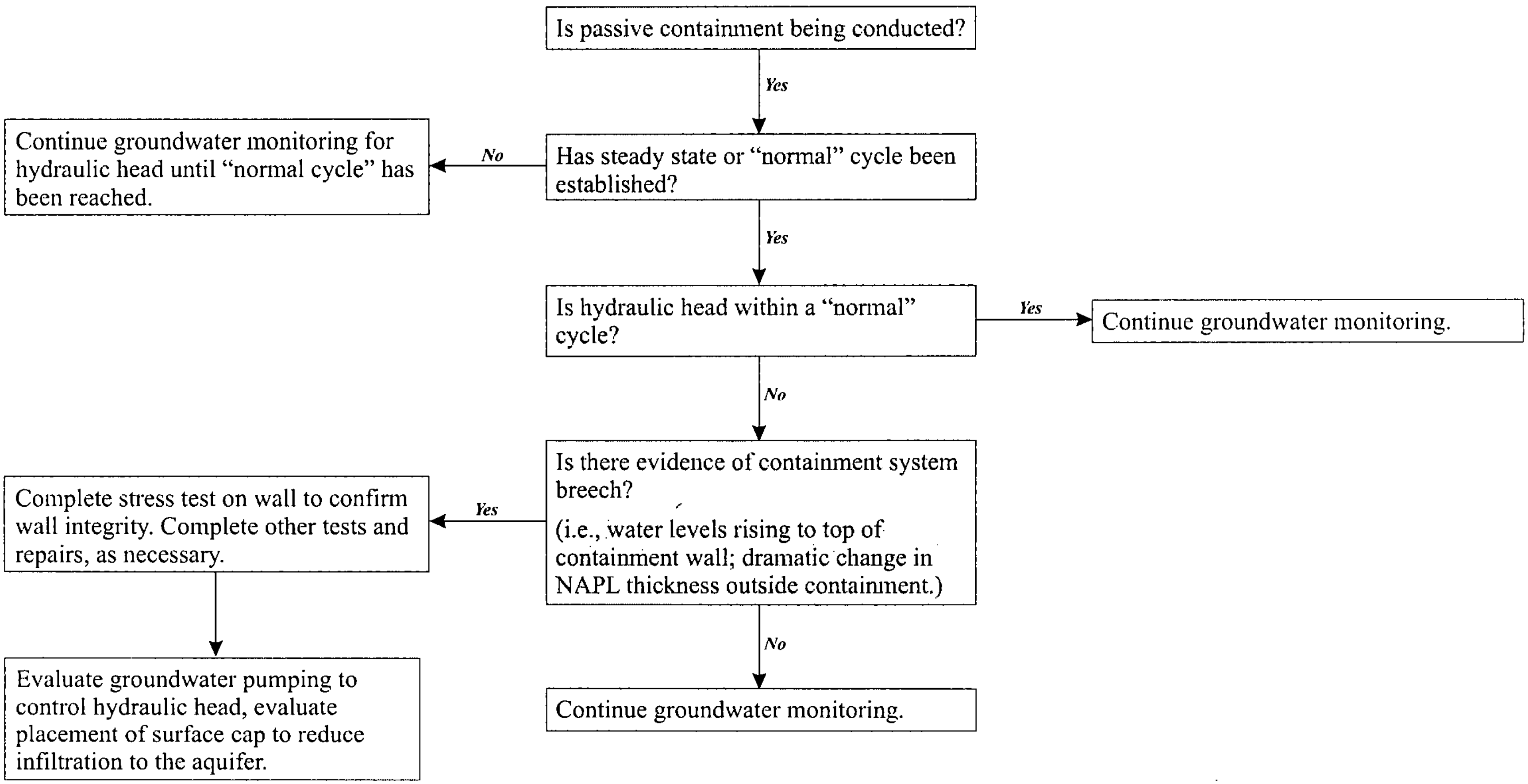
Reporting will focus on documentation of the wall performance. After the performance-monitoring period begins, reporting will consist of the following:

- Groundwater data will be presented monthly. The purpose of monthly reporting will be to monitor the hydraulic gradients that will be in flux because of the containment system, river stage fluctuations, and seasonal precipitation that may affect gradients. The data set shall include water level and NAPL measurements, groundwater gradient illustrations, and histograms of select monitoring wells. An interpretation and evaluation of the data will not be presented in the monthly reports;

- Two semiannual groundwater-monitoring reports will be submitted each year. Each semiannual report will summarize data collected during the previous reporting period. The semiannual reports will be prepared after each sampling event, and will include data tables, trend charts, groundwater elevation contour maps, isoconcentration diagrams, and complete data listings for the respective time period;

- The semiannual monitoring reports will also provide water quality analytical results and a brief discussion of the specific trends in the data and other items of interest; and

- All collected data will be submitted in Excel format on CD-ROM. The semiannual reports will be submitted in Word format, and all illustrations will be submitted in PDF format.



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McCORMICK AND BAXTER
CREOSOTING COMPANY SITE
Portland, Oregon

Figure 3
BARRIER WALL CONTAINMENT SYSTEM

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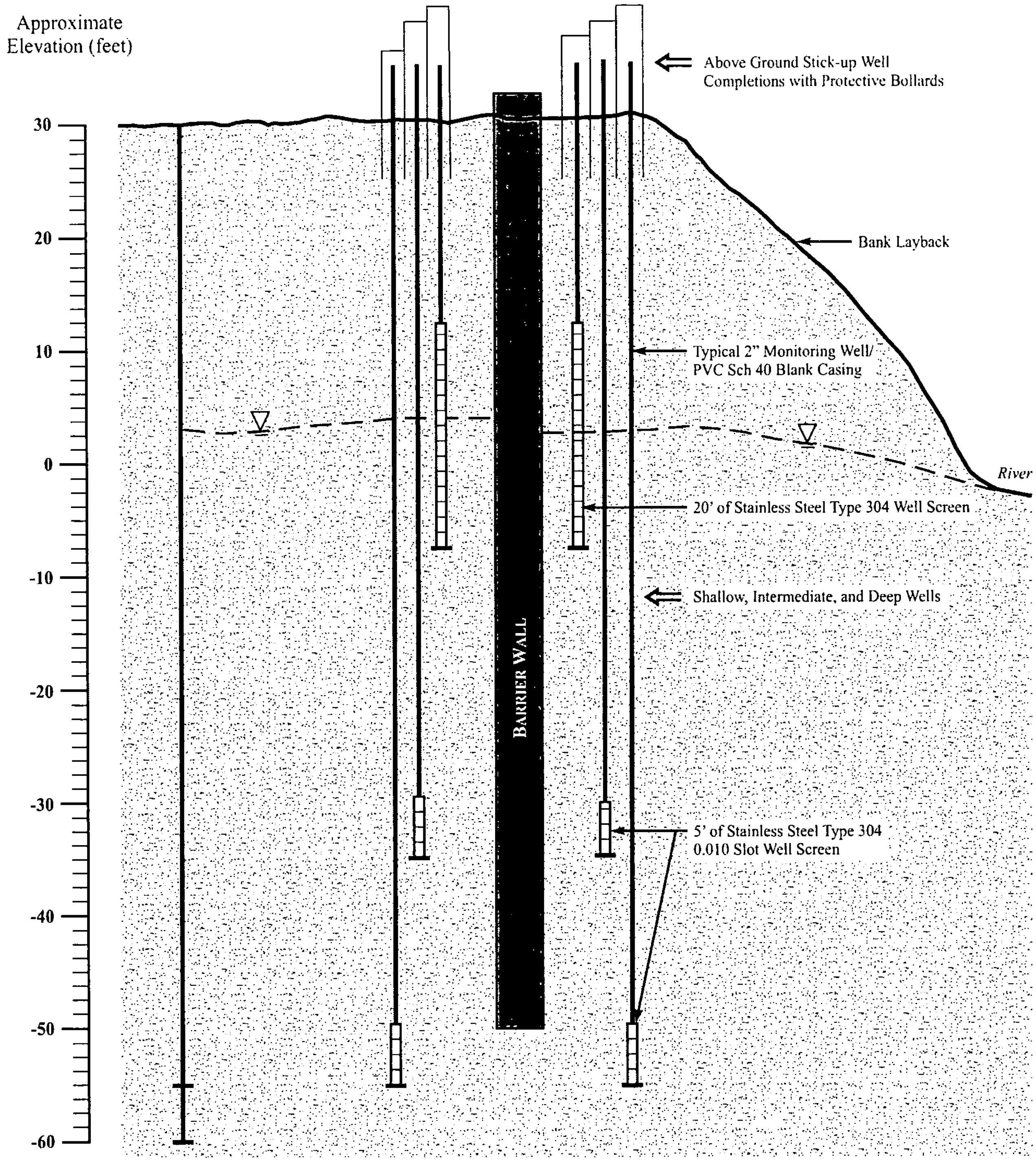

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Table 1
Performance Monitoring Program
McCormick and Baxter Creosoting Company Site
Portland, Oregon

Well Identification	Monitoring Frequency	Measurement Method	Screen Interval (feet BGS)
Existing Wells			
MW-As	Weekly	Manual/Water level indicator	22 to 27
MW-32i	Weekly	Manual/Water level indicator	48.3 to 58.3
PW-1d	Weekly	Manual/Water level indicator	65 to 124
PW-2d	Weekly	Manual/Water level indicator	71 to 91
MW-Ks	Weekly	Manual/Water level indicator	13.5 to 33.5
MW-33s	Weekly	Manual/Water level indicator	19.37 to 29.37
MW-Js	Weekly	Manual/Water level indicator	13 to 33
MW-14s	Weekly	Manual/Water level indicator	18.34 to 38.34
MW-Cs	Weekly	Manual/Water level indicator	19 to 24
MW-15s	Weekly	Manual/Water level indicator	10.97 to 30.97
MW-18s	Weekly	Manual/Water level indicator	23.95 to 43.95
EW-22s	Weekly	Manual/Water level indicator	20 to 40
MW-17s	Weekly	Manual/Water level indicator	14.85 to 34.85
EW-23s	Weekly	Manual/Water level indicator	18 to 38
MW-34i	Weekly	Manual/Water level indicator	55.2 to 75.2
MW-31s	Weekly	Manual/Water level indicator	9.42 to 19.42
MW-Os	Weekly	Manual/Water level indicator	13 to 35
MW-5s	Weekly	Manual/Water level indicator	9.34 to 29.34
MW-2s	Weekly	Manual/Water level indicator	13.15 to 33.15
MW-3s	Weekly	Manual/Water level indicator	10.03 to 30.03
MW-7s	Weekly	Manual/Water level indicator	16.35 to 36.35
MW-8i	Weekly	Manual/Water level indicator	16.35 to 36.35
MW-23d	Weekly	Manual/Water level indicator	171.17 to 181.17
MW-LRs	Weekly	Manual/Water level indicator	14.8 to 34.8
MW-10s	Weekly	Manual/Water level indicator	14.60 to 34.60
MW-35s	Weekly	Manual/Water level indicator	20 to 40
MW-7-WC	Weekly	Manual/Water level indicator	25 to 35
Proposed New Wells			
MW-36s	*Hourly	Pressure Transducer	TBD
MW-36i	*Hourly	Pressure Transducer	TBD
MW-36d	*Hourly	Pressure Transducer	TBD
MW-37s	*Hourly	Pressure Transducer	TBD
MW-37i	*Hourly	Pressure Transducer	TBD
MW-37d	*Hourly	Pressure Transducer	TBD
MW-38s	Weekly	Manual/Water level indicator	TBD
MW-38i	Weekly	Manual/Water level indicator	TBD
MW-38d	Weekly	Manual/Water level indicator	TBD
MW-39s	Weekly	Manual/Water level indicator	TBD
MW-39i	Weekly	Manual/Water level indicator	TBD
MW-39d	Weekly	Manual/Water level indicator	TBD
MW-40s	*Hourly	Pressure Transducer	TBD
MW-40i	*Hourly	Pressure Transducer	TBD
MW-40d	*Hourly	Pressure Transducer	TBD
MW-41s	*Hourly	Pressure Transducer	TBD
MW-41i	*Hourly	Pressure Transducer	TBD
MW-41d	*Hourly	Pressure Transducer	TBD

Table 1
Performance Monitoring Program
McCormick and Baxter Creosoting Company Site
Portland, Oregon

Well Identification	Monitoring Frequency	Measurement Method	Screen Interval (feet BGS)
MW-42s	Weekly	Manual/Water level indicator	TBD
MW-42i	Weekly	Manual/Water level indicator	TBD
MW-42d	Weekly	Manual/Water level indicator	TBD
MW-43s	Weekly	Manual/Water level indicator	TBD
MW-43i	Weekly	Manual/Water level indicator	TBD
MW-43d	Weekly	Manual/Water level indicator	TBD
MW-44s	*Hourly	Pressure Transducer	TBD
MW-44i	*Hourly	Pressure Transducer	TBD
MW-44d	*Hourly	Pressure Transducer	TBD
MW-45s	*Hourly	Pressure Transducer	TBD
MW-45i	*Hourly	Pressure Transducer	TBD
MW-45d	*Hourly	Pressure Transducer	TBD
MW-46s	Weekly	Manual/Water level indicator	TBD
MW-47s	Weekly	Manual/Water level indicator	TBD
MW-48s	Weekly	Manual/Water level indicator	TBD
MW-49s	Weekly	Manual/Water level indicator	TBD
MW-50s	*Hourly	Pressure Transducer	TBD
MW-51s	*Hourly	Pressure Transducer	TBD
MW-52s	Weekly	Manual/Water level indicator	TBD
MW-53s	Weekly	Manual/Water level indicator	TBD
MW-54s	*Hourly	Pressure Transducer	TBD
MW-55s	*Hourly	Pressure Transducer	TBD
MW-56s	Weekly	Manual/Water level indicator	TBD
MW-57s	Weekly	Manual/Water level indicator	TBD
MW-58s	*Hourly	Pressure Transducer	TBD
MW-58i	Weekly	Manual/Water level indicator	TBD
MW-58d	*Hourly	Pressure Transducer	TBD
River Gauge	*Hourly	Pressure Transducer	TBD

TBD= To be determined in the field during installation.